

REMARKS

Amendment summary

Claim 1 is amended to incorporate the subject matter of claim 2, which is cancelled.

Claim 1 is further amended for the sake of clarity and to recite the voltage time/interruption time ratio. Support for this amendment may be found, e.g., in Paragraph No. [0150] of the specification as published (U.S. Patent Application Publication No. 2004/0134682).

No new matter is added by this Amendment, and Applicant respectfully submits that entry of this Amendment is proper.

Status of the claims

Claims 1-2 were rejected under 35 U.S.C. § 112 as allegedly being indefinite. Claim 1 was rejected twice under 35 U.S.C. § 102(b) - once based on Ellis (GB 2214520) and once based on Nidola et al. (U.S. Patent No. 6,019,878) (hereinafter “Nidola”). Claim 2 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ellis.

Response to rejection of claims 1-2 under 35 U.S.C. § 112

The Office Action indicated that claims 1-2 were allegedly indefinite because “is performed” is allegedly not a positive method limitation.

Claim 1 has been amended, and Applicant submits that the amendment overcomes the § 112 rejection. Applicant therefore respectfully requests the reconsideration and withdrawal of this § 112 rejection.

Response to rejection of claim 1 under 35 U.S.C. § 102 based on Ellis

Applicant notes that the subject matter of claim 2 has been incorporated into claim 1, thereby rendering this rejection moot. Applicant respectfully requests that this § 102 rejection be withdrawn.

Response to rejection of claim 1 under 35 U.S.C. § 102 based on Nidola

Applicant notes that the subject matter of claim 2 has been incorporated into claim 1, thereby rendering this rejection moot. Applicant respectfully requests that this § 102 rejection be withdrawn.

Response to rejection of claim 2 under 35 U.S.C. § 103 based on Ellis

The present claim 1 recites an electroplating process of electroplating an electrically conductive substrate comprising, in part, a voltage time/interruption time ratio of 0.1 to 1.0, a voltage time not longer than 10 seconds, and an interruption time not less than 1×10^{-12} seconds.

The intermittent electroplating described above ensures a uniform plating thickness. The reason seems to be that while the plating metal deposit is preferentially *dissolved* by the spike current flowing momentarily toward the anode (in the marginal area of the substrate board surface and around the openings for via holes where the amount of deposition of the plating metal tends to be larger), the plating metal is *precipitated* by the spike current flowing momentarily toward the cathode (in the central area of the substrate surface and the interior parts of the via holes where the amount of plating metal deposition tends to be smaller as in the remainder of the region), with the result being a highly uniform electrodeposition thickness. Since the voltage time is not longer than 10 seconds, the film thickness will be even. Further, the

interruption time of not less than 1×10^{-12} seconds means that the diffusion of metal ions will be sufficient to improve crystallinity.

Applicant respectfully submits that Ellis does not render the presently claimed invention obvious because there is no reason to alter the teachings of Ellis such that the voltage time/interruption time ratio is 0.1 to 1.0, as recited in the present claims. Ellis instead discloses an electrochemical process in which the disclosed ratio is 20 (Example 1 in Ellis) or 10 (Example 2 in Ellis). In Ellis, the voltages are applied as follows:

Example 1: forward for 10 msec and reverse for 0.5 msec

Example 2: forward for 10 msec and reverse for 1 msec

Accordingly, Ellis discloses voltage time/interruption time ratios of 20 and 10 in Examples 1 and 2, respectively. Applicant respectfully submits that there is no reason to alter the teachings of Ellis to arrive at the presently claimed invention.

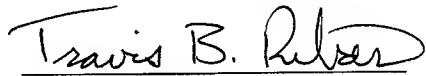
Accordingly, Applicant respectfully submits that the presently claimed invention is not obvious over Ellis, and respectfully requests the reconsideration and withdrawal of this § 103 rejection.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: December 30, 2008